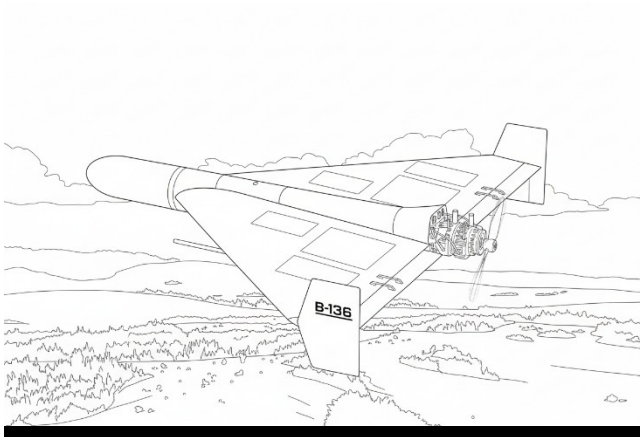
Shahed-136 (Geran-2)



IDENTITY & DESIGNATION

Official Designation: Shahed-136 (Iranian) / Geran-2 (Russian designation)
Manufacturer: Iran Aircraft Manufacturing Industrial Company (HESA)
Country of Origin: Iran
Year Introduced: ~2021 (first confirmed combat use 2022)
Proliferation Status: Iran → Russia, Houthi forces, proxy groups

CLASSIFICATION

Domain: Air
Category: Military
Sub-Category: Loitering Munition / One-Way Attack (OWA) UAV
Terminal Mode: Expendable — Kamikaze

PHYSICAL SPECIFICATIONS

Weight: ~200 kg
Wingspan: 2.5 m
Length: 3.5 m
Warhead: ~40–50 kg explosive
Airframe: Delta-wing design, composite/metal construction

PROPULSION & PERFORMANCE

Propulsion Type: Piston engine (MADO MD550 or similar) — rear-mounted pusher
Max Speed: ~185 km/h
Max Range: ~2,500 km (one-way)
Endurance: ~10–12 hours
Operating Altitude: 60–1,000 m (typical low-level attack profile)
Max Altitude: ~4,000 m

GUIDANCE, NAVIGATION & CONTROL

Primary Guidance: GPS/INS + GLONASS — pre-programmed waypoints
Control Link: None in flight — fully autonomous after launch
Terminal Guidance: GPS waypoint; later variants may include optical/EO seeker [VERIFY]
Man-in-Loop Required: No — fire-and-forget
Operator Skill: Low — pre-programmed waypoint route loaded before launch
Fiber-Optic Option: No

WEAPONS & PAYLOADS

Warhead: 40–50 kg HE fragmentation or thermobaric
Kill Mechanism: Kinetic impact + explosive detonation

COUNTERMEASURE VULNERABILITY PROFILE

RF Jamming: LOW — No active RF link in flight; autonomous GPS/INS
GPS Spoofing: MODERATE — GPS-dependent terminal guidance; INS provides partial backup
EMI/EMC Attack: MODERATE — Consumer/commercial-grade electronics; limited hardening
Microwave Attack: MODERATE — Unhardened wiring acts as antenna
Laser DEW: HIGH — Slow speed (185 km/h), predictable straight-line approach, low RCS but detectable

Kinetic Intercept: MODERATE — Small RCS (delta wing), low IR signature (piston engine); but slow and predictable
Net / Physical Capture: DIFFICULT — 200 kg at 185 km/h; too large/fast for net systems
Cyber / Hack: LOW — No active data link to exploit in flight
Active Camouflage Defeat: N/A — Autonomous guidance, no visual pilot to fool
Overall Vulnerability Rating: MODERATE

CRUISE MISSILE CONVERGENCE NOTES

The Shahed-136 IS a cruise missile by every engineering definition. It is a powered, guided, expendable munition that navigates autonomously using GPS/INS to a pre-programmed target over long range. The only meaningful differences from a BGM-109 Tomahawk are: (1) no TERCOM/DSMAC terrain matching — simpler GPS-only guidance, (2) no terrain-hugging flight profile — flies at constant altitude, (3) dramatically lower cost ($20,000–50,000 vs. $1.5M+), (4) smaller warhead and shorter range. The Shahed-136 validates the book's central thesis: the technological line between "drone" and "cruise missile" has been erased. This is the platform that proves the convergence is complete at the low end.

OPERATIONAL HISTORY

Most prolific one-way attack drone in history. Extensively used by Russia against Ukrainian infrastructure (power grid, cities, military targets) beginning October 2022. Launched in salvos of 5–40+ to saturate air defenses. Also used by Houthi forces against shipping and Saudi/UAE targets. Ukrainian forces have developed acoustic detection networks and intercept protocols. Primary interception methods: SHORAD missile systems, mobile AA guns, even rifle fire. Unit cost creates severe cost asymmetry problem for defenders ($20K drone vs. $500K+ interceptor missile).

SOURCES & CROSS-REFERENCES

Wikimedia:
https://commons.wikimedia.org/wiki/Category:Shahed_136
Cross-Ref: See: Shahed-238 (jet-powered evolution), Tomahawk (cruise missile comparison)